

**Abstract**

A channel sounding system employs orthogonal sequences to meet the Cramer-Rao bound in estimating the channel and achieves considerable simplification of the structure necessary to perform the channel sounding. These advantages are achieved by  
5 developing orthogonal sequences of substantially arbitrary length as a function of first and second existing orthogonal sequences and using such orthogonal sequences for channel sounding in lieu of M-sequences. The techniques of the invention are especially suited to systems that use multiple antennas at the transmitter and multiple antennas at the receiver, so called multiple-input multiple-output (MIMO) systems.